

S.1 The National Environmental Policy Act

DOE prepared the *Draft Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada* to provide the background, data, and analyses to help decisionmakers and the public understand the potential environmental impacts of the proposed repository. The Department issued the Draft EIS, dated July 1999, for public comment; a 199-day comment period began August 13, 1999, and ended on February 28, 2000. In May 2001, DOE issued the *Supplement to the Draft Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada*, which was the subject of a public comment period that ended on July 6, 2001. The comment period was extended to August 13, 2001, for about 700 reviewers inadvertently omitted from the mailing list. In Volume III of this EIS, DOE has presented and responded to all comments on the Draft EIS and the Supplement to the Draft EIS received by August 31, 2001. All comments received by DOE after August 31, 2001, were responded to as time and resources permitted. However, all comments received after August 31, 2001, whether or not responded to, were considered by the Department. Based on this consideration, the Department concluded that none raised new issues not already reflected in timely comments and already considered. DOE has prepared this *Final Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada* consistent with the National Environmental Policy Act (NEPA) and the Nuclear Waste Policy Act, as amended. This Final EIS updates information in the Draft EIS and Supplement, provides additional information, and responds to public comments.

S.2 Purpose and Need for Agency Action

S.2.1 PURPOSE AND NEED

For many years civilian and defense-related activities have produced spent nuclear fuel and high-level radioactive waste. These materials have accumulated—and continue to accumulate—at 72 commercial and 5 DOE sites across the United States. Figure S-1 shows the locations of these sites and Yucca Mountain.

In passing the Nuclear Waste Policy Act in 1982, Congress affirmed that the Federal Government is responsible for the permanent disposal of spent nuclear fuel and high-level radioactive waste. In the 1987 amendments to the Act, Congress directed the Secretary of Energy to determine whether to recommend that the President approve the Yucca Mountain site for development of a repository for the permanent disposal of these materials.

S.2.2 BACKGROUND

DOE is responsible for implementing a permanent solution for the management of spent nuclear fuel and high-level radioactive waste. *Spent nuclear fuel* is fuel that has been withdrawn from a nuclear reactor following irradiation; it consists mostly of uranium, and is usually intensely radioactive because it also contains a high level of radioactive nuclear fission products. Commercial spent nuclear fuel was used in civilian nuclear reactors to produce electricity. The majority of DOE spent nuclear fuel comes from defense production reactors, naval propulsion plant reactors, and test and experimental reactors. In addition to conventional uranium fuel, DOE is responsible for the disposition of weapons-usable plutonium that is surplus to national security needs. This EIS includes analysis of surplus weapons-usable plutonium that DOE plans to convert to mixed-oxide (uranium and plutonium) fuel as part of the commercial spent nuclear fuel inventory and surplus weapons-grade plutonium that DOE plans to immobilize and include as part of the high-level radioactive waste inventory.

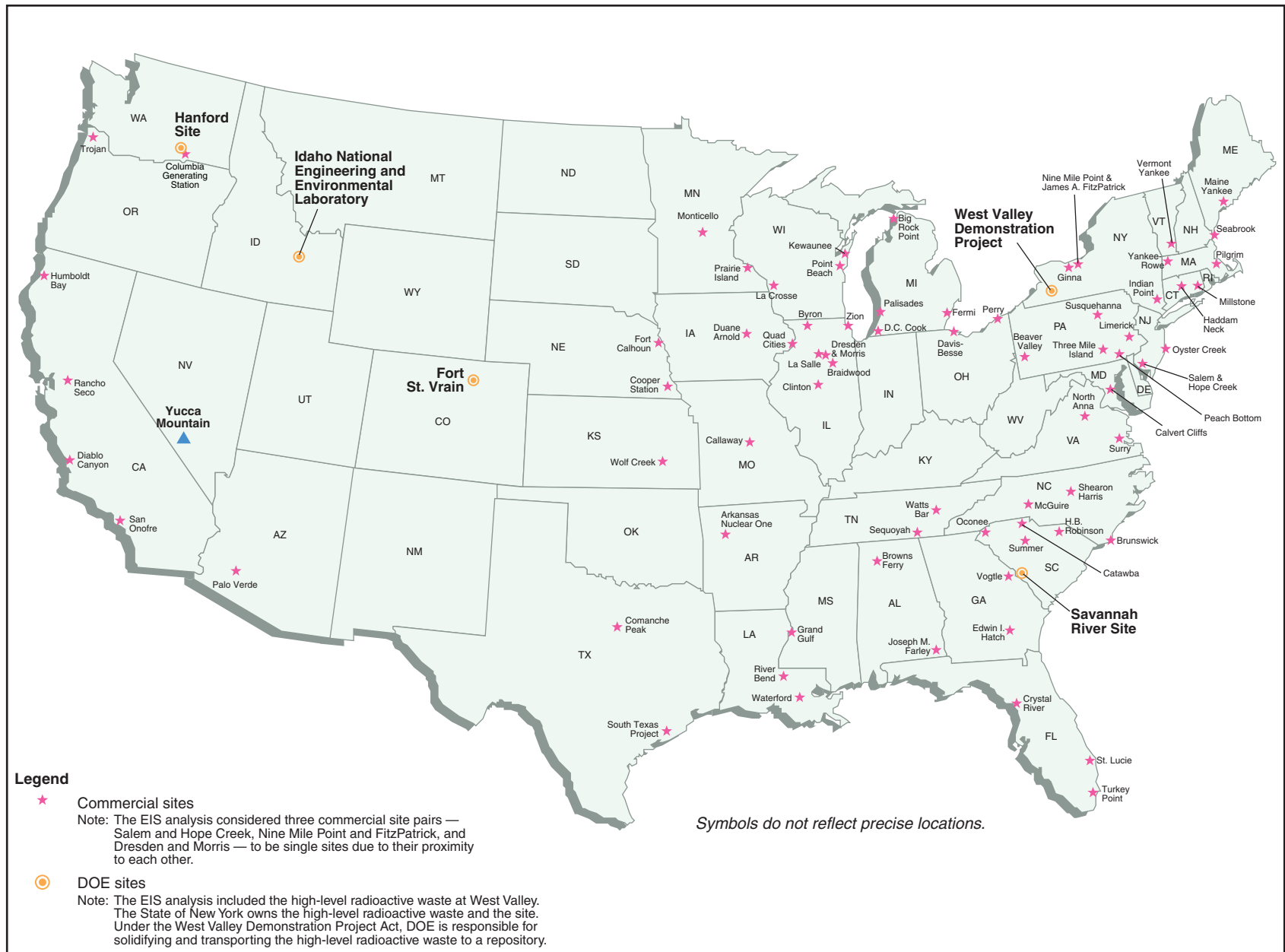


Figure S-1. Locations of commercial and DOE sites and Yucca Mountain.

When the DOE production reactors were operating, they used a controlled fission process to irradiate nuclear fuel and produce materials for nuclear weapons. After the spent nuclear fuel was removed from the reactors, chemical processes extracted the weapons-usable materials from the spent nuclear fuel. This is called *reprocessing*.

The byproduct remaining after reprocessing is *high-level radioactive waste*. High-level radioactive waste also resulted from the reprocessing of naval reactor fuels and some commercial reactor fuels, some DOE test reactor fuels, and some non-DOE research reactor fuels.

The Proposed Action includes disposal of spent nuclear fuel and high-level radioactive waste. In addition, DOE is responsible for the disposal of other waste types, referred to as *Greater-Than-Class-C* and *Special-Performance-Assessment-Required* wastes. These waste types are low-level radioactive wastes that have high radionuclide concentrations. They could become eligible for disposal in a geologic repository in the future, so DOE has analyzed the cumulative environmental impacts associated with the potential disposal of these wastes in a repository at Yucca Mountain.

MATERIALS EVALUATED IN THIS EIS

Spent nuclear fuel is fuel that has been withdrawn from a reactor following irradiation.

- **Commercial** – from civilian nuclear powerplants that generate electricity (including mixed-oxide fuel)
- **DOE** – from DOE production reactors, naval reactors, test and experimental reactors, and research reactors (including some non-DOE reactors)

High-level radioactive waste is primarily waste that resulted from the chemical extraction of weapons-usable materials from the spent nuclear fuel. Immobilized surplus weapons-usable plutonium is part of the high-level radioactive waste inventory.

Greater-Than-Class-C waste is low-level radioactive waste generated by commercial nuclear reactors that does not meet shallow land burial disposal limits.

Special-Performance-Assessment-Required waste is low-level radioactive wastes generated in DOE production reactors, research reactors, reprocessing facilities, and research and development activities that exceed the Nuclear Regulatory Commission Class C shallow-land burial disposal limits.

S.2.2.1 Legislative History

Methods to dispose of radioactive wastes have been studied since the late 1950s. In 1980, President Carter declared that the safe disposal of radioactive waste generated by both defense and civilian nuclear activities is a national responsibility. In the *Environmental Impact Statement, Management of Commercially Generated Radioactive Waste* (DOE/EIS-0046, 1980), DOE analyzed the environmental impacts that could occur if it implemented alternative strategies for the management and disposal of spent nuclear fuel. The disposal alternatives included mined geologic disposal, very deep hole waste disposal, disposal in a mined cavity that results in rock melting, island-based geologic disposal, subseabed disposal, ice sheet disposal, well injection disposal, transmutation, space disposal (for example, launching waste into orbit around the sun), and no action. The Record of Decision for that EIS, issued in 1981, announced the DOE decision to pursue the mined geologic disposal alternative.

In 1982, Congress enacted the Nuclear Waste Policy Act in recognition of the need to provide for the permanent disposal of spent nuclear fuel and high-level radioactive waste in the United States. This Act established the Federal Government's responsibility to provide permanent disposal of the Nation's spent nuclear fuel and high-level radioactive waste and set forth a process and schedule for the disposal of these

materials in a geologic repository. In 1986, following the process outlined in the original Nuclear Waste Policy Act, DOE narrowed the number of potentially acceptable sites for a geologic repository to three: Deaf Smith County in Texas; the Hanford Site in Washington; and Yucca Mountain. President Reagan approved the DOE recommendation of these sites as suitable for site characterization. In 1987, Congress amended the Nuclear Waste Policy Act and directed the Secretary of Energy to characterize only Yucca Mountain as a potential location for a geologic repository, setting forth a process for the Federal Government to decide whether to designate Yucca Mountain as the site for a repository.

The site characterization program consists of scientific, engineering, and technical studies and activities. Site investigations and evaluations include the construction of the Exploratory Studies Facility, which is a large underground laboratory consisting of a long tunnel or *main drift* and side tunnels and rooms inside the mountain; investigations of the hydrology and geology of the site; studies of socioeconomics, cultural resources, and terrestrial ecosystems; and monitoring of air quality, meteorological, radiological, and water resource data.

SITE CHARACTERIZATION OF YUCCA MOUNTAIN

DOE has had a program of investigations and evaluations to assess the characteristics of Yucca Mountain as a potential monitored geologic repository and to provide information for this environmental impact statement. Data from site characterization activities have been used to describe the existing environment at the Yucca Mountain site and to assess the potential impacts of the proposed repository.

S.2.2.2 Related Activities and Decisions

Decision Process for Site Recommendation.

Under the NWP, DOE is required to hold hearings in the vicinity of Yucca Mountain to provide the public with opportunities to comment on the Secretary's possible recommendation of the site to the President. If, after completion of the hearings and site characterization activities, the Secretary decides to recommend that the President approve Yucca Mountain, the Secretary would notify the Governor and Legislature of the State of Nevada accordingly. No sooner than 30 days after the notification, the Secretary may submit the recommendation to the President to approve the site for development of a repository. The NWP further requires that the Secretary's recommendation to the President be based on the record of information developed through the site characterization program, as well as other sources, including the Final EIS. The Secretary will consider the Final EIS, as well as comments from Federal, state, local, and tribal governments, other organizations, and interested individuals on the Draft EIS and the Supplement to the Draft EIS in making a determination on whether to recommend the site to the President.

If the Secretary recommends the Yucca Mountain site to the President, the NWP requires that a comprehensive statement of the basis for the recommendation, including the Final EIS, accompany the recommendation. Since issuing the Draft EIS and the Supplement to the Draft EIS, DOE has issued several publicly available documents that would form part of this comprehensive statement. These documents address such topics as:

- Baseline postclosure models for Total System Performance Assessment
- Preliminary engineering specifications, including definitions of repository operating modes
- Preclosure safety analysis
- Sensitivity studies using alternative models and data

- Analyses of unquantified uncertainties
- Updates of scientific information and analysis of long-term performance of the lower-temperature repository operating mode
- Preliminary evaluation of the suitability of the Yucca Mountain site for a repository

The key documents that were issued for public review and comment in support of a potential site recommendation include:

- *Yucca Mountain Science and Engineering Report: Technical Information Supporting Site Recommendation Consideration*, May 2001
- *Preliminary Preclosure Safety Assessment for Monitored Geologic Repository Site Recommendation*, July 2001
- *FY01 Supplemental Science and Performance Analysis*, July 2001
- *Yucca Mountain Preliminary Site Suitability Evaluation*, August 2001
- *Total System Performance Assessment-Analyses for Disposal of Commercial and DOE Waste Inventories at Yucca Mountain-Inputs to Final Environmental Impact Statement and Site Suitability Evaluation*, August 2001.

DOE has established guidelines (10 CFR Part 963) for evaluating the suitability of the Yucca Mountain site by assessing how specific design concepts would work within the natural system and by comparing the results of these assessments to the applicable regulatory standards. As required by the NWPA, DOE would apply these guidelines in determining the suitability of Yucca Mountain as a site for a repository.

Decision Process for U.S. Nuclear Regulatory Commission Licensing. If the Yucca Mountain site is approved, DOE will submit a License Application to the Nuclear Regulatory Commission for authorization to construct a geologic repository. The NWPA directs the Commission to adopt the Final EIS to the extent practicable in its decision on whether to issue a construction authorization and license for such a repository.

The Nuclear Regulatory Commission has issued requirements governing its licensing of DOE to construct a geologic repository and to receive and possess nuclear material at that repository (10 CFR Part 63). As mandated by law, these requirements are required to be consistent with the final standards for Yucca Mountain issued by the Environmental Protection Agency (40 CFR Part 197). Figure S-2 shows the sequence of past disposal decisions and projected activities.

REGULATORY STANDARDS

40 CFR Part 197: *Public Health and Environmental Radiation Protection Standards for Yucca Mountain, NV* issued by the Environmental Protection Agency.

10 CFR Part 63: *Disposal of High-Level Radioactive Wastes in a Proposed Geologic Repository at Yucca Mountain, NV* issued by the Nuclear Regulatory Commission.

10 CFR Part 963: *General Guidelines for Nuclear Waste Repositories*; Yucca Mountain Site Suitability Guidelines issued by DOE.

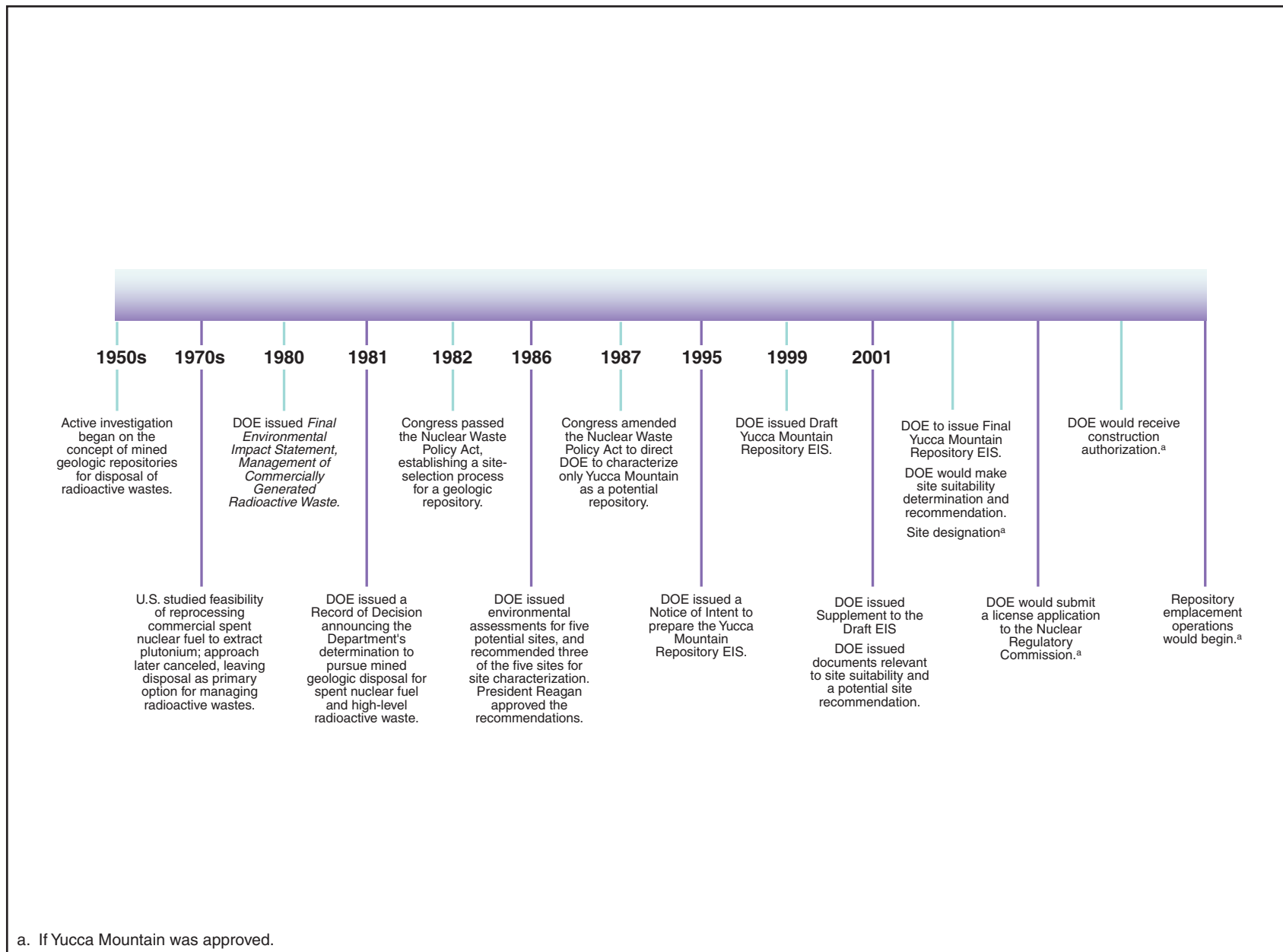


Figure S-2. Sequence of past disposal decisions and future repository activities.